In the Claims:

1.   (original) A method for serial data transmission between a position measuring system and a processing unit, comprising:

transmitting position data and further data between said position measuring system and said processing unit in serial form as digital data words;

transmitting up-to-date position data between said position measuring system and said processing unit upon transmission of a position request command; and

always transmitting further data, whose processing is not time-critical, immediately following said transmitting said up-to-date position data.

2.   (original) The method in accordance with claim 1, wherein said further data is transmitted from said position measuring system to said processing unit.

3.   (original) The method in accordance with claim 1, further comprising transmitting a position request command for requesting said up-to-date position data; and

always transmitting immediately following said position request command, further data, whose processing is not time-critical.

4.   (original) The method in accordance with claim 3, wherein said further data is transmitted from said processing unit to said position measuring system.

5.   (original) The method in accordance with claim 1, further comprising transmitting said up-to-date position data and said position request command in the form of digital data words

of a predetermined word length, or as data packets comprising digital data words.

6.   (original) The method in accordance with claim 3, further comprising transmitting said up-to-date position data and said position request command in the form of digital data words of a predetermined word length, or as data packets comprising digital data words.

7.   (original) The method in accordance with claim 1, further comprising transmitting additional non-time-critical data in the form of digital data words of a predetermined word length, or as data packets comprising digital data words.

8.   (original) The method in accordance with claim 7, wherein said additional non-time-critical data comprises additional data and additional data commands.

9.   (original) The method in accordance with claim 3, further comprising transmitting additional non-time-critical data in the form of digital data words of a predetermined word length, or as data packets comprising digital data words.

10.   (original) The method in accordance with claim 9, wherein said additional non-time-critical data comprises additional data and additional data commands.

11.   (original) The method in accordance with claim 1, further comprising:

having a position request signal arrive in said processing unit during said

transmission of non-time-critical data;

interrupting said transmission of said non-time-critical data;

immediately transmitting a position data request command to said position measuring system in the place of said non-time-critical data, whereupon said up-to-date position data are immediately transmitted from said position measuring system to said processing unit.

12. (original) The method in accordance with claim 3, further comprising:

having a position request signal arrive in said processing unit during said transmission of non-time-critical data;

interrupting said transmission of said non-time-critical data;

immediately transmitting a position data request command to said position measuring system in the place of said non-time-critical data, whereupon said up-to-date position data are immediately transmitted from said position measuring system to said processing unit.

13. (original) The method in accordance with claim 11, wherein said interrupting said transmission of said non-time-critical data is completed at a later time after said up-to-date position data has been completely transmitted by said position measuring system to said processing unit.

14. (original) The method in accordance with claim 1, further comprising interrupting said transmission of said non-time-critical data when a position request command arrives in said position measuring system during said transmission of non-time-critical data; and

transmitting said up-to-date position data to said position measuring system in place of said non-time-critical data.

15.   (original) The method in accordance with claim 3, further comprising interrupting said transmission of said non-time-critical data when a position request command arrives in said position measuring system during said transmission of non-time-critical data; and

transmitting said up-to-date position data to said position measuring system in place of said non-time-critical data.

16.   (original) The method in accordance with claim 3, wherein all data transmitted between said position measuring system and said processing unit are transmitted over a common data channel.

17.   (original) The method in accordance with claim 3, wherein data transmitted from said position measuring system to said processing unit are transmitted via a first data channel, and said data transmitted from said processing unit to said position measuring system are transmitted via a second data channel.

18.   (original) The method in accordance with claim 3, further comprising storing said non-time-critical data.

19.   (original) The method in accordance with claim 18, wherein said non-time-critical data is transmitted by said processing unit to said position measuring system and said storing comprises storing said transmitted non-time-critical data in a memory unit of said position measuring system.

20.   (original) The method in accordance with claim 19, further comprising storing non-time-critical data transmitted by said position measuring system in a second memory unit of said processing unit.

21.   (original) The method in accordance with claim 18, further comprising transmitting memory unit status data, which contain at least information regarding an actual memory status of a memory unit.

22.   (original) The method in accordance with claim 1, further comprising transmitting several different position request commands, which are assigned different processing priorities; and

        transmitting said up-to-date position data in accordance with said assigned different processing priorities.

23.   (original) The method in accordance with claim 3, further comprising transmitting several different position request commands, which are assigned different processing priorities; and

transmitting said up-to-date position data in accordance with said assigned different processing priorities.

24.   (original) The method in accordance with claim 22, wherein said different processing priorities comprise:

a first position request command used for position control, which causes said transmission of said up-to-date position data to be at the highest priority; and

a second position request command used for digitizing a workpiece contour, which causes said transmission of said up-to-date position data at a lower priority relative to said first position request command.

25.   (original) The method in accordance with claim 22, further comprising interrupting transmission of position data which had been requested by a position request command of a first level of processing priority upon transmission of a position request command of a level of processing priority higher than said first level.

26.   (original) The method in accordance with claim 23, wherein said different processing priorities comprise:

a first position request command used for position control, which causes said transmission of said up-to-date position data to be at the highest priority; and

a second position request command used for digitizing a workpiece contour, which causes said transmission of said up-to-date position data at a lower priority relative to said

first position request command.

27.   (original) The method in accordance with claim 23, further comprising interrupting transmission of position data which had been requested by a position request command of a first level of processing priority upon transmission of a position request command of a level of processing priority higher than said first level.

28.   (original) The method in accordance with claim 5, wherein with said transmitting of either of said digital data words or data packets, a data word identification is transmitted, which unequivocally identifies a beginning and type of said respective associated digital data word or data packet.

29.   (currently amended) A device for serial data transmission, comprising:

a processing unit;

a position measuring system, wherein position data and further data are transmitted between said position measuring system and said processing unit in serial form as digital data words, said position measuring system comprises a control unit which, upon receipt of a position request, causes a transmission of up-to-date position data between said position measuring system and said processing unit and, following said up-to-date position data, <u>always</u> causes transmission of further data, whose processing is not time-critical.

30.   (original) The device in accordance with claim 29, wherein said processing unit

comprises a second control unit, which causes transmission of said position request command to

said position measuring system for requesting position data and, following said transmission of the

position request command always causes said transmission of further data, whose processing is

not time-critical.

31.   (original) The device in accordance with claim 29, further comprising a single data

channel for transmitting data between said position measuring system and said processing unit.

32.   (original) The device in accordance with claim 29, further comprising a first data

channel and a second channel for transmitting data between said position measuring system and

said processing unit, wherein said first data channel transmits data in a first direction and said

second data channel transmits data in a direction opposite to said first direction.

33.   (original) The device in accordance with claim 30, wherein said position measuring

system comprises a memory unit, which is used for storage of non-time-critical data transmitted

by said processing unit.

34.   (original) The device in accordance with claim 30, wherein said processing unit

comprises a memory unit, which is used for storage of non-time-critical data transmitted by said

position measuring system.

35. (original) The device in accordance with claim 29, wherein said control unit comprises a processor.

36. (new) A method for serial data transmission between a position measuring system and a processing unit, comprising:

transmitting up-to-date position data from a position measuring system to a processing unit;

transmitting non-time critical data, subsequent to said transmitting up-to-date position data, from said position measuring system to said processing unit; and

transmitting related non-time-critical signals.

37. (new) The method in accordance with claim 36, wherein said transmitting up-to-date position data always occurs between said non time critical signals.

38. (new) The method in accordance with claim 36, wherein parameters of said position measuring system are transmitted via said non-time-critical signals.

39.   (new) The method in accordance with claim 36, wherein measured temperature values are transmitted via said non-time-critical signals.

40.   (new) The method in accordance with claim 36, wherein diagnostic data of said position measuring system are transmitted via said non-time-critical signals.

41.   (new) The method in accordance with claim 36, wherein assignment information is transmitted with each of said non-time-critical signals.

42.   (new) The method in accordance with claim 36, further comprising requesting, via said processing unit, transmission of said non-time-critical signals from said position measuring system.

43.   (new) The method in accordance with claim 36, wherein said non-time-critical signals are transmitted in the form of digital data words of a preset word length or as data packets having digital data words.

44.   (new) The method in accordance with claim 36, wherein the data transmitted from the position measuring system to the processing unit are transmitted via a first data channel and the data transmitted from the processing unit to the position measuring system are transmitted via a second data channel.

45.   (new) The method in accordance with claim 36, wherein said transmitting said up-to-date position data takes place between said non-time-critical signals.

46.   (new) The method in accordance with claim 36, wherein said non-time-critical signals are chronologically distributed over several blocks.

47.   (new) A system for serial data transmission comprising:

a position measuring system;

a processing unit in communication with said position measuring system; and

means for transmitting up to date position data between said position measuring system and said processing unit and for transmitting non-time critical data subsequent to said transmitting said up to date position data, wherein transmission of related non-time-critical signals takes place.

48.   (new) The system in accordance with claim 47, further comprising:

a first data channel in communication with said position measuring system and said processing unit and transmitting data from said position measuring system to said processing unit; and

a second data channel in communication with said position measuring system and said processing unit and transmitting data from said processing unit to said position measuring system.

49.   (new) The system in accordance with claim 47, wherein transmission of said up to date position data takes place between said non-time-critical signals.

50.   (new) The system in accordance with claim 47, wherein a transmission of parameters of said position measuring system takes place via said non-time-critical signals.

51.   (new) The system in accordance with claim 47, wherein a transmission of measured temperature values takes place via said non-time-critical signals.

52.   (new) The system in accordance with claim 47, wherein a transmission of diagnostic data of said position measuring system takes place via said non-time-critical signals.

53.   (new) The system in accordance with claim 47, wherein a transmission of assignment information takes place with said non-time-critical signals.

54.   (new) The system in accordance with claim 47, wherein a transmission of said non-time-critical signals takes place in the form of digital data words of a preset word length or as data packets having digital data words.

55.   (new) The system in accordance with claim 47, wherein said non-time-critical signals are chronologically distributed over several blocks.